PLASMA-TAIL ACTIVITY AND THE INTERPLANETARY MEDIUM AT HALLEY'S COMET DURING ARMADA WEEK: 6-14 MARCH 1986

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The encounters of five spacecraft with Halley's Comet during 6-14 March 1986 offered a unique opportunity to calibrate the solar-wind interaction with cometary plasma as recorded by remote wide-field and narrow-field/narrowband imaging. Perhaps not generally recognized in the comet community is the additional opportunity offered by the Halley Armada to study the structure of the solar-wind and interplanetary magnetic field (IMF) in three dimensions using five sets of data obtained over similar time intervals and heliocentric distances, but at somewhat different heliolatitudes. In fact the two problems--comet physics and the structure of the interplanetary medium--are coupled if one wants to understand what conditions pertained at the comet between the encounters.

Using solar data, four of us (MBN, JTH, MD, PSM) made pre-encounter predictions of cometary crossings of the heliospheric current sheet and resultant plasma-tail "disconnection events" (DE's). These "indirect data" have been extended into the interplanetary medium by the Armada, especially the VEGA-1 and -2 magnetometers (on which author KS is co-I). The focus of the talk will be on establishing physical associations between large-scale plasma-tail activity and conditions in the IMF and solar-wind plasma during Halley Armada Week.

Perhaps most striking is the association of the spectacular DE which developed on March 7-8 with: (1) a reversal of the cometary (sunward) magnetic barrier polarity observed by VEGA-1 and VEGA-2 at the encounters (March 6.3 and 9.3 UT), and (2) a +/- sector boundary observed in the cruise phase on March 7.9 UT by VEGA-1 which maps to the comet at the time of onset of the DE. Although the solar-wind plasma picture on March 7-8 is less complete, the IMF results appear to constitute strong support for the frontside reconnection model of DE's (Niedner and Brandt 1978). The period March 10-14 appears to be very complex as the comet was skimming the interplanetary current sheet, with several crossings sometimes occurring on the same UT day. Similarly, the large-scale plasma-tail behavior evident in the imagery is highly complex. An attempt will be made to combine the imagery and the spacecraft data available to-date to form a coherent picture of the state of the interplanetary medium and the comet's response to it.